

the decennial celebrations of the foundation of that university.

Since its foundation, in 1887, van 't Hoff's name has been associated with the "Zeitschrift für physikalische Chemie" as one of its editors. In 1899 the thirty-first volume of that journal was devoted to a "Festschrift" in honour of the twenty-fifth anniversary of his doctorate, many of his old pupils and many other men of science contributing papers in honour of the occasion.

The above is but a brief and meagre account of the life-work of one of the greatest geniuses the world has ever seen. It would take many pages of this journal to convey anything like an adequate idea of the extent and originality of his researches. But the only true appraisal of van 't Hoff's work and influence is to be found in the living science of to-day and in the minds of countless thousands of scientific workers. As time rolls on his name and his work will stand out ever more prominently in the story of the development of chemical theory. We are still too near the mountain to be able to appreciate fully the grandeur of its heights.

The present writer is one of those whose privilege it is to have worked under van 't Hoff. That was in the days at Charlottenburg, when the investigation of the oceanic salt deposits was just beginning. Every day endeared van 't Hoff to the small band of workers in his laboratory. His joy in his work, the simple and unaffected friendliness of his nature, and the marvellous power of his mind affected us most deeply. All who worked with van 't Hoff quickly learned to love and respect him, and we were no exception to the rule. The kindliness of his heart and the simple charm of his manner were no less characteristic of him than the genius that is known to all.

With the passing away of van 't Hoff chemistry loses one of her greatest men. His was indeed one of the master-minds of science. All his work was characterised by the penetrating insight and the wide creative outlook of a lofty and commanding genius. When one reflects on the vast regions of knowledge which he either created or systematised and marvellously developed—stereochemistry, chemical dynamics, chemical equilibrium and affinity, the laws of solutions—the thought occurs to one that future ages will see in him the Newton of chemistry.

However that may be, chemical science, which today so deeply mourns his loss, will ever rank van 't Hoff amongst the greatest chemists of any age.

F. G. D.

#### NOTES.

THE death of the able and accomplished naturalist Prof. Félix Plateau occurred at Ghent on March 4 after a long and painful illness. Prof. Plateau only recently retired from the active duties of his chair of zoology in the University of Ghent, and was appointed *Professeur émérite*. From his earliest days he pursued the study of his favourite science with indefatigable energy, devoting himself, in the main, to the arthropods, and especially to the Insecta and their physiological and physico-chemical aspects. Though of slight build and apparent delicacy, yet he was enabled, since he visited the British Association in Liverpool in 1870, to carry out a long series of researches for more than forty years, enriching the literature of his subject in a noteworthy way with both pen and pencil. His labours embraced such subjects as the vision of arthropods (including insects), respiratory movements of insects, centre of gravity in insects, functions of antennæ, physico-chemical observations on aquatic insects,

movements and innervation of the central organs of the circulation in insects, errors committed by Hymenoptera in visiting flowers, means of protection in Abraxas, observations as to whether the syrphides admire colours of flowers, and a large number of researches on the behaviour of insects with regard to flowers, natural and artificial, besides numerous papers on allied subjects. These memoirs were illustrated by his facile pencil, and were carried out with great labour and ingenuity by means of apparatus devised by himself. Prof. Plateau was a member of the Royal Academy of Sciences of Belgium, and was much esteemed for his amiability and wide culture. He will be greatly missed as an earnest and indefatigable investigator of that side of entomology from which modern science has been enabled to draw safe deductions instead of vague suppositions. He leaves a widow and several sons and daughters.

It is difficult to believe that Viscount Dalrymple was serious in asking the First Lord of the Admiralty in the House of Commons on March 8 "whether he would arrange for the fleet to carry out their heavy gun-firing practice round the coast at some other period of the year than in the middle of harvest time, when the resulting heavy rain may cause serious loss to the farming community." Mr. McKenna answered the question evidently in the belief that it was asked in good faith; he began by saying "there is no evidence that the firing causes heavy rain," and we do not need to concern ourselves with the rest of the reply. No doubt, whether Lord Dalrymple was jesting or not, many people still cling to the belief in the power of explosions to produce rain, and we referred last week to several cases in point. In the new number of *Symons's Meteorological Magazine* Mr. F. Gaster points out that the firing of big guns is carried on more frequently at Shoeburyness than at any other point on the coast, but that the mean annual rainfall at Shoeburyness, and on the coast of Essex generally, is the lowest in the British Isles. This seems to be the most convincing form of reply to those who profess to believe, or do believe, in the efficacy of gun-firing to produce rain.

LORD CRAWFORD presided at the meeting on March 8, at the British Museum, to present Sir Edward Maunde Thompson, late director and principal librarian, with his portrait, painted by the president of the Royal Academy (Sir Edward Poynter), who is also a trustee of the museum. Among the subscribers were the Archbishop of Canterbury (appointed a trustee in 1884 by Queen Victoria), who made the presentation, the Speaker, Sir Henry Howorth, Lady (John) Evans, and the officers and assistants of the museum, including Mr. F. G. Kenyon (director and principal librarian), Mr. L. Fletcher, F.R.S. (director of the natural history departments), Mr. A. R. Dryhurst and Mr. C. E. Fagan (assistant secretaries), Mr. Basil H. Soulsby, and many others. The portrait will be exhibited at the Royal Academy, and may one day join the collection of portraits of principal librarians and trustees in the board-room at the British Museum, which includes the portrait of Sir Antonio Panizzi by G. F. Watts, and Sir Joseph Banks by Lawrence.

DR. OSTEN BERGSTRAND, for some time observer at the Upsala Observatory, Sweden, has been appointed professor of astronomy in the Upsala University and director of the observatory.

THE Belgian Maritime Association has engaged M. H. Phillipot, assistant in charge of the meridian service at the Uccle Observatory, as professor of astronomy on board

the Belgian naval college ship *L'Avenir*. The engagement is for six months, and the ship left Sunderland for Montevideo on March 9.

THE next triennial prize of 300*l.*, under the will of the late Sir Astley P. Cooper, will be awarded to the author of the best essay or treatise on "The Means by which the Coagulability of the Blood may be Altered." Essays, written in English, must be sent to Guy's Hospital, addressed to the physicians and surgeons, on or before January 1, 1913.

THE annual congress of French geographical societies is to be held this year at Roubaix, during the exhibition in that town, from July 29 to August 5, under the presidency of Prince Roland Bonaparte.

At the recent meeting of the Australasian Association for the Advancement of Science in Sydney, the Mueller memorial medal was awarded to Mr. Robert Etheridge, curator of the Australian Museum, in recognition of the value of his numerous contributions to the palæontology and ethnology of Australasia.

A REUTER message from Portici states that on March 12 a portion of the crust around the crater of Vesuvius, 300 metres long and 24 metres in thickness, suddenly subsided, causing an appreciable shock of earthquake. Small portions of the crust continue to fall in, and a canopy of ashes is hanging over the mountain. As the result of the collapse the crater seems to be lower, and Vesuvius bears the appearance of having been decapitated.

WE learn from the Vienna correspondent of *The Times* that on March 9 the Austrian Academy of Sciences held a special sitting to celebrate the fiftieth anniversary of the appointment of the Archduke Rainer to be its curator. The Archduke marked the occasion by giving a sum amounting to about 4166*l.* to the academy as an endowment for those members who may need to keep in touch with the progress of their special branches of study in other countries.

ON Tuesday next, March 21, Dr. M. Aurel Stein will deliver the first of a course of three lectures at the Royal Institution on "Explorations of Ancient Desert Sites in Central Asia." The Friday evening discourse on March 24 will be delivered by Sir David Gill on "The Sidereal Universe," on March 31 by Prof. H. S. Hele-Shaw on "Travelling at High Speeds on the Surface of the Earth and above It," and on April 7 by Sir J. J. Thomson on "A New Method of Chemical Analysis."

PROF. VLAD. KULCZYŃSKI, the distinguished arachnologist, of Cracow University, is just concluding the thirtieth year of his scientific activity. The physiological committee of the Cracow Academy of Sciences intends to commemorate this anniversary by presenting to him an album with photographs of his fellow-zoologists and friends, who are invited to send their photographs, together with at least 20 kronen (=17*s.*), to Prof. E. Godlewski, Cracow University. The surplus of the capital remaining after paying for the album will be used to cover the costs of editing the work "The Arachnological Fauna of Poland and the adjacent Countries." The special meeting of the physiological committee, when the album is to be delivered to Prof. Kulczynski, will be held on March 24 at midday.

At a special meeting lately held in the Berlin Royal Museum of Natural History, the committee for the exploration of the dinosaur-bearing deposits of German East Africa exhibited a few of the more remarkable specimens

already received. The collection consists chiefly of the remains of Sauropoda, some much larger than the gigantic species of North America. One humerus measures more than 2 metres in length, and some of the cervical vertebrae are twice as large as those of *Diplodocus*. The leader of the exploring party, Dr. W. Janensch, reports the discovery of two new localities in which dinosaurian bones are abundant, and the chairman of the committee, Prof. W. Branca, is making an appeal for the gift of additional funds to continue the work.

THE discovery of *Archæocyathinae* in a piece of limestone brought from the Antarctic continent by the Shackleton expedition, has excited renewed interest in these problematical Cambrian fossils. A typical series of specimens, obtained by Mr. Griffith Taylor, from South Australia, has accordingly been arranged for exhibition, with explanatory diagrams, in the Department of Geology, British Museum (Natural History). These organisms have now been discovered in the oldest fossil-bearing rocks in nearly all parts of the globe. Their form is that of two cups, one within the other, and their skeleton consists of granular calcite, not of spicules. The cups are pierced with perforations, and the space between the two is more or less subdivided by radial partitions and horizontal bars or plates, which are also perforated. The whole structure of the skeleton suggests that currents of water originally flowed through it, but its non-spicular construction prevents its reference to a sponge. It has even been compared with a calcareous alga, such as the existing *Acetabularia*, but the differences are so important that it is difficult to conceive of *Archæocyathus* as a primitive plant. In the museum the collection is placed between the Protozoa and the sponges.

WE record with regret the death, on March 9, of Colonel John Pennycuik, C.S.I., late R.E., at the age of seventy years. His name is best known in connection with the Periyar Diversion and the construction of the huge dam across the upper waters of the river Periyar, in the Travancore territory, and taking the water from the lake thus formed through a tunnel in the Western Ghats across to the opposite slope to supply the areas of the Madura district. Colonel Pennycuik was at the head of the Madras Public Works Department for several years, and retired in 1896, when he became president of the Royal Indian Engineering College at Coopers Hill, and held the post until the summer of 1899.

THE annual general meeting of the Ray Society was held on March 9, Dr. R. F. Scharff being in the chair. The report of the council stated that by the issue last year of part viii. of the "British Nudibranchiate Mollusca," for 1909, and of vol. ii., part ii., of the "British Annelids," for 1910, the publications had been brought up to date, and that for the present year two volumes were already in preparation, being vol. iv. of the "British Desmidiaceæ," with about thirty plates, and vol. iii. of the "British Tunicata," with sixteen plates, fourteen being coloured, completing that work. The balance-sheet showed a balance in hand of 55*l.* 2*s.* 8*d.*, with an investment of 125*l.* Consols. The Right Hon. Lord Avebury was re-elected president, Dr. F. DuCane Godman treasurer, and Mr. John Hopkinson secretary.

At the meeting of the Royal Geographical Society on March 13, Dr. T. G. Longstaff described his crossing of the Purcell Range in British Columbia in the course of last summer. This range lies parallel to, but is distinct from, the Selkirk Range, and both, while situated along-

side the Rocky Mountains, are much older than the latter, representing in this region the original main axis of the North American Cordillera. The Purcell Range, like the Selkirk proper, attains no great height in its southern portion, but the northern half rises well above the snow-line in numerous glacier-clad peaks. The author was accompanied by Mr. Wheeler, a well-known Canadian mountaineer and topographer, who with theodolite and survey-camera made large additions to the survey of the region where the Dominion Government has of late suspended work to press forward that in more fertile areas. A large glacier which descends to the valley floor amongst the timber was visited, and its present phase was found to be one of retreat. Stations were occupied up to more than 8000 feet, and from the photographic survey 11,489 feet was determined as the height of the principal peak. This may be Mount Nelson or Mount Hammond, which, however, the author thinks may be identical. By the latter part of September it was necessary to leave the high valleys, after Mr. Wheeler had completed a considerable amount of surveying, and after the expedition had gained a general knowledge of the Purcell range and the location of its highest and most glaciated portions.

MR. R. A. LESLIE MOORE amused his audience at the Royal Society of Arts on February 24 by an account of Indian superstitions—omens, the evil eye, spooks and goblins, mystic animals, birds, insects, reptiles, trees, and so forth. The learned student of custom and tradition who is familiar with the abundant literature gathered on this subject in India will find little that is novel in this pleasant but rambling paper, or in the discursive remarks of Sir G. Birdwood and other Indian authorities which followed. But the paper will have a useful effect if only by directing attention to the vast, and still only partially garnered, material which India can supply.

THE recent death of Sir Francis Galton, the founder of the science of eugenics, naturally leads to a discussion in *The Fortnightly Review* for March on the relation of eugenics to Mendelian genetics, contributed by Mr. G. C. Nuttall. The latter is working, and apparently on successful lines, to bring law and order into the inchoate mass of the facts of heredity; the former is striving to teach man to use his conscience, as well as his intellect, in dealing with this new knowledge. The writer believes it to be proved that feeble-mindedness could practically be stamped out in two generations if the State rigorously determined to check the perennial flow of the strain of the unfit into our national life. All this may be true; but the voice of the teacher is still that of one preaching in the wilderness. The remedy involves the seclusion of all persons defective in mind or body, a drastic method which our democracy, largely swayed by sentimental emotions, seems, for the present at least, not prepared to adopt.

THE Public Works Department of the Government of Egypt has published a second edition of the List of Animals in the Zoological Gardens at Giza, near Cairo, compiled by Captain Stanley S. Flower, the director, and illustrated by twenty plates reproduced from photographs. The names of species inhabiting Africa (inclusive of Madagascar), Arabia, and Syria are respectively indicated by an asterisk. An important feature of the work is a record of the number of years specimens have lived in the gardens since Captain Flower took over charge in 1898. At the annual census, taken in October, 1910, the total number of animals living in the gardens was 1464, referable to 391 species, both these figures being higher than in any previous year.

IN No. 1796 (vol. xxxix., pp. 489-93) of the Proceedings of the U.S. National Museum, Mr. R. L. Moodie describes a labyrinthodont from the Kansas Coal Measures, which is of interest alike on account of the rarity of such remains in that formation and from its own intrinsic characters; for this labyrinthodont, which is described as a new genus and species, *Erpetosuchus kansensis*, differs from all its relatives in the presence of a pair of oval vacuities on each side of the inner wall of the lower jaw, comparable to those of a crocodile, while it is further distinguished by the uniform character and shortness of its teeth. It is assigned to the family Labyrinthodontidae. Greek scholars will regret that the genus was not named *Herpetosuchus*.

TAKING as his text a statement by Mr. C. B. Devonport, to the effect that self-coloured fowls, as being more conspicuous, tend to be eliminated by natural enemies, whereas barred birds, on account of being less conspicuous, are more immune to attack, Dr. Raymond Pearl, in the February number of *The American Naturalist*, states that he has found the alleged contrast in regard to conspicuousness to be well founded. On the other hand, as the result of experiment, he denies the truth of the theory based on these facts. "We have been prone," he writes, "to agree that because an organism was coloured or formed in such a way as to be inconspicuous, it was, therefore, necessarily protected from attack by its enemies. . . . The logic of such reasoning is flawless. . . . But a conclusion may be perfectly logical and still not true. In the study of protective coloration, including mimicry, it is essential that a discovery that an organism is to human eyes inconspicuous or not readily distinguishable from some other organism shall not be considered the final goal."

THE recent appearance in vast numbers of the giant African snail *Achatina fulica* in Ceylon forms the subject of an article by Mr. E. E. Green in the February issue of *The Zoologist*. This bulimus-like species is a native of East Africa, but appears to have been introduced many years ago into Mauritius, where it is now common. To Calcutta it was introduced about half a century ago, and by 1877 was abundant in the gardens of the houses in Chominghi, while it had also crossed the Hughli to Howra and Barrakpur. About ten years ago a collector introduced the species on his estate in the highlands of central Ceylon, but soon after attempts were made to exterminate the intruders, and it was believed effectually. It appears, however, that some escaped destruction, and of these a couple were recently carried down with vegetables to the low country. Here they increased to such an amazing extent, over an area of about five square miles, that their numbers were to be reckoned by millions, no fewer than 227 being counted in a cluster on the stem of a cocoanut palm in a length of about 6 feet. Naturally the natives were in fear that their crops would be devastated; but, as a matter of fact, little or no serious damage has been inflicted, and it appears that the species largely acts the part of a scavenger, so that in some degree, at any rate, its introduction is a benefit. The adults are attacked by a terrapin of the genus *Nicoria*, and in its young stages the species probably has many foes. The enormous fecundity of these snails on their first introduction to the lowlands was probably a temporary phenomenon, and their numbers now appear to be diminishing.

DR. RUDOLF VON RITTER-ZÁHONY gives (Fisheries, Ireland, Sci. Invest., 1910, iv.) an account of the Chaetognatha taken during the years 1905-6 off the coast of Ireland. As was to be expected in the surface waters



of the temperate zone, the group is almost solely represented in the Irish epiplankton by *Sagitta bipunctata* and *Spadella cephaloptera*; *Sagitta serratodentata* also occurs, but is comparatively rare, and only a few young *Eukrohnia hamata* were observed. In the mesoplankton the first two forms were entirely absent; *E. hamata* predominated there, and with it were nine other species, some entirely confined to the mesoplankton, while others were found there only in the adult condition after having passed through their earlier stages of development in the epiplankton of warmer seas. In the same publication (v.) Messrs. E. W. L. Holt and L. W. Byrne give a list of 103 fishes of the Irish Atlantic slope, taken beyond the 100-fathom line, with references to the memoirs in which they are described.

AN insect pest of the camphor trees on the main island of Japan and Formosa, in the shape of a new species of the Psyllidæ, *Trioxa camphoræ*, is described by Prof. C. Sasaki in the Journal of the College of Agriculture, Tokio University (vol. ii., No. 5). The larvæ give rise to flattish button galls on the leaves.

THE first article in vol. xxviii. of the Journal of the College of Science, Tokio University, is devoted to short botanical studies from the tropics, by Prof. M. Miyoshi. Discussing the characters of tropical foliage leaves, he notes the tendency to produce firm entire leaves with a smooth or shining surface. Data are also supplied with regard to the manner in which leaves are wetted by rain. Another note refers to the Indian cherry tree *Prunus Puddum*, confirming the suggestion made by Sir J. D. Hooker that it is allied to the Japanese mountain cherry *P. pseudo-cerasus*, which it resembles in flower characters; from *P. campanulata* it differs markedly in the form of the fruit.

A THIRD paper embodying researches upon the sexual organs and reproduction in the cycad, *Dioon edule*, in this case dealing with fertilisation and embryogeny, is contributed by Prof. C. J. Chamberlain to *The Botanical Gazette* (December, 1910). In Mexico, fertilisation takes place during the month of April. The sperms escape through the ruptured end of the pollen tube with a small amount of liquid of high osmotic value, and one nucleus enters the egg, often slipping out of its ciliated sheath as it squeezes past the neck cells; it is suggested that the passage is prepared by the liquid issuing from the pollen tube, which plasmolyses the neck cells. After fertilisation a number of free nuclei are formed; then there is a distinct but evanescent formation of cell walls throughout the entire proembryo which only materialises into walls at the basal end where suspensor and embryo are differentiated.

EXPERIMENTS are continuously being conducted in the West Indies to obtain varieties of sugar-cane suited to the various soil and climatic conditions in the different districts of the islands. Numbers of new canes are raised from seed annually, and promising plants are carefully propagated; analysis is then made of the juice. Details of experiments conducted on these lines are given in Pamphlet No. 66, recently issued by the Imperial Department of Agriculture for the West Indies.

THE official forecast of the wheat crop of South Australia is put at 11.91 bushels per acre, this being 1.35 bushels fewer than the actual yield obtained twelve months ago. So late as last September it was thought that the present harvest would be 20 per cent. greater than the previous one, but an unusually severe attack of disease, locally known as "takeall," has since set in, and has in some

cases destroyed entire crops. The disease is caused by the fungus *Ophiobolus graminus*, an interesting account of which occurs in *The Journal of Agriculture for South Australia* (No. 5). It is urged that a plant pathologist is needed for the study of crop diseases, which, according to the writer, cause a loss of nearly half a million of money each year in South Australia alone.

FROM the report of the Botanic Station, Experiment Plots and Agricultural School, Dominica, 1909-10, we learn that the general conditions of the gardens is satisfactory. A strong feature of the work is the distribution of material for planting purposes. More than 79,000 plants were sent out during the year, as well as large numbers of seeds. The experiments with economic plants include, among others, trials with spineless limes, varieties of citrus plants, Para rubber, and grafted cacao. The lime industry appears to be well established, and the conditions of production are steadily improving. Para rubber continues to do well in the wet districts of the island. Much remains to be done in improving the cacao industry; it is considered that the yield might be considerably higher if better methods were more generally used.

DR. E. J. BUTLER has been appointed director of the Agricultural Research Institute and College, Pusa, in place of Mr. Coventry, who is now Inspector-General of Agriculture in India. The annual report of the work of this institution describes the chief investigations carried on by the various departments. In the botanical department Mr. and Mrs. Howard are continuing their work on wheat, and are obtaining very promising results. Dr. Leather's work on the water requirements of plants is calculated to afford information valuable alike to the agriculturist and the irrigation engineer. Much attention is paid in the entomological department to industries that depend on the products of insects, eri, mulberry, tussor silk, and the cultivation of lac being the chief. The mycologist has carried out important investigations on the blister blight of tea and the palm disease in the Godavery Delta. A bacteriological section has been added, and a cotton expert appointed.

IN the *Bolletino della Società geografica Italiana* for February, Major A. Tancredi, who has done much to advance our knowledge of the climate of Eritrea, describes the salt plain lying to the east of the Abyssinian tableland. Situated at about 110 metres below sea-level, and forming an area of inland drainage, it has a mean temperature of about 31° C., while the maximum in summer is said to reach 50° C. From the salt deposits here formed, the Abyssinian merchants obtain the blocks of rock-salt which are used as currency throughout the country, rapidly rising in value towards the more remote western parts of the tableland. The volcano of Ert-Alé to the southward was seen from the hills above the Saline of Assale, but was not visited.

FROM the results of the Swedish expedition to Spitsbergen in 1908 under Prof. G. de Geer, we have received a first part containing the hydrographical observations by N. von Hofsten and S. Bock. The temperature and salinity of the sea were determined at about thirty points both on the outward and the homeward voyage. These factors showed a marked increase on the conditions which existed about 1902, when ice in August still surrounded the southern portion of Spitsbergen, and indicated a return to such as existed in 1898, when the Nathorst expedition could sail round Spitsbergen and visit Gills Land. The topography of Eisfjord, on the western coast of Spitsbergen, was studied during the second half of July and

August, as well as the hydrographical conditions, which showed that the warm salt Atlantic water flows into the fjord, and has there its temperature and salinity lowered by the glacier ice descending from the land.

In the Monthly Review of the Seismic Activity of the Earth's Crust, issued by the Kaiserl. Hauptstation für Erdbebenforschung in Strassburg, we find for June, 1910, references to forty-seven earthquakes. A few of these were destructive, but the greater number appear to have been local tremors. For each of these disturbances we have the date, the time (local and Greenwich), the character of the movement, its duration, direction, and general remarks. The fact that Japan records, on the average, 100 earthquakes per month, and the world probably experiences several thousands, it seems extremely likely that this publication will increase in size, but, as it stands, it must frequently be of great value in the interpretation of teleseismic records.

THE Canadian Department of Mines has issued two advance chapters of the annual report on the mineral production of Canada during the year 1909. Each chapter is by Mr. John McLeish, chief of the division of mineral resources and statistics; one deals with the production of iron and steel in Canada in 1909, and the other with the production of coal and coke. The former industry showed a very satisfactory and steady growth as compared with previous years, but the coal-mining industry was marked during 1909 by a decreased production in Nova Scotia and an increased production in the western provinces, resulting in an aggregate decrease for the whole of Canada of 384,836 tons (short tons of 2000 lb.), or about  $3\frac{1}{2}$  per cent. Although iron ores are of wide occurrence throughout Canada, being found practically in every province, the development of these resources has not kept pace with the growth of Canadian metallurgical industries. About 17 per cent. only of the iron ore used in Canadian furnaces during 1909 was of domestic origin. Much of the coke and limestone also was imported, so that Canadian iron industries are now, and have been for a number of years, largely dependent on imported raw material. Coal mining has long been the most important of Canada's mining industries, and in 1909 is credited with 27 per cent. of the total mineral production of the country. The output in 1909 is more than twice that of ten years ago, about four times the output of twenty years ago, and nearly ten times the production of 1879. Notwithstanding its large coal resources, Canada's total coal production in 1909 was only about 56.4 per cent. of the estimated consumption, and the additional requirements were supplied by imports, chiefly from the United States.

THE meteorological chart of the Indian Ocean for March, issued by the Meteorological Committee, quotes several cases of phosphorescent seas that have been observed in recent years. Among the most interesting is one forwarded to the Danish Meteorological Institute by Captain Gabe in the Strait of Malacca in June, 1909. Luminous waves were observed travelling from west to east, and gradually assumed the form of long arms, with dark intervals between them. These issued from an apparent focus, around which they rotated, which seemed to be on the horizon. An illustration of the phenomenon shows that the beams of light were somewhat curved, the concave edge being in the direction of rotation (clockwise). The brightness lasted about a quarter of an hour. A somewhat similar case of rotatory light system was observed by Captain Breyer in August last near the Natuna Islands, but the direction of rotation round the apparent focus in this instance was anti-clockwise.

In the *Verhandlungen der Deutschen Physikalischen Gesellschaft* for February 15, Prof. M. Planck removes one of the difficulties in the proof of his expression for the radiation from a perfectly black body. It will be remembered that the proof depended on the assumption that a simple Hertz oscillator could only possess an amount of energy which was an integral multiple of a certain small quantity of energy, or, in other words, that energy was atomic in structure, and emission and absorption of energy must take place by "atomic" steps. In the present paper Prof. Planck shows that, although emission must still take place in steps, absorption may be taken as continuous, and the amount of energy possessed by an oscillator at any instant may be a fractional number of "atoms." If, however, the probability that the oscillator emits an "atom" of energy be taken proportional to the whole number of "atoms" of energy it possesses, the fractional excess being disregarded, the final expression for the energy radiated by a perfectly black body in terms of temperature and wave-length becomes identical with that formerly given.

In a recent short publication of the Royal Observatory of Wilhelmshaven, the new director, Captain Capelle, explains how it is proposed to deal with arrears in the publication of magnetic work of that institution, and introduces a discussion of the magnetic character of the year 1910, by Prof. Bidlingmaier, who is now a member of his staff. Dr. Bidlingmaier regards the degree of disturbance of each individual hour as given by the numerals 0, 1, or 2, according to the extent of the departure of the corresponding portion of magnetic curve from the position characteristic of that hour on the average quiet day. The character of the hour is shown graphically by the colour of a small square, white, shaded, or black. The squares for adjacent hours and days are juxtaposed, so that the information is given for a whole month in a rectangular area about 80x65 mm., and that for a whole year in a couple of pages. Summing the numerical values for any specified number of hours, and taking the mean, a numerical measure is obtained for the average disturbance of the period, and certain conclusions are drawn as to the reality of 24-hour and 30-day disturbance periods. Whether the character of the hour is determined solely by reference to the horizontal force is not clear. A fuller explanation seems to be in view. The definition of disturbance presents a considerable resemblance to Sabine's, and whether it will commend itself to the general body of magneticians remains to be seen.

THE Bulletins of the Cracow Academy of Sciences for 1910 contain three important papers by Prof. L. Bruner and his colleagues on photo-chemistry. The first action studied was that of light in promoting the conversion of maleic into fumaric acid in presence of bromine. In the absence of light, the bromine merely combines with the two acids to form dibromosuccinic acids, the action proceeding fifteen times more quickly with maleic than with the more stable fumaric acid. In presence of light, perhaps because the bromination may become reversible, the main action is to cause the maleic to change into fumaric acid. This change, which is not effected in presence of chlorine or iodine or of the compounds  $\text{ICl}$  and  $\text{ICl}_3$ , was traced by measurements of conductivity and of solubility. The amount of fumaric acid finally produced depends on the nature of the light, but if this is fixed there is a definite ratio between the fumaric acid produced and the bromine used; by increasing the quantity of bromine, the maleic acid can be changed completely into fumaric acid. These observations reveal a striking contrast with catalytic

actions in which light is not concerned, since the concentration of the catalyst is then without influence on the final equilibrium between isomers. Other characteristics of photo-chemical action were shown by the investigation of the bromination of toluene under the influence of light. This action is extraordinarily sensitive to the presence of oxygen, which appears to give rise to oxidised bromine-compounds which carry on the action after the light has been removed; bromination in the side chain can, indeed, be effected almost violently *in the dark* if the material is subjected to the action of slightly ozonised oxygen, which thus acts as a most efficient "carrier" of bromine to the side chain. When these disturbing effects were got rid of by exclusion of oxygen and the addition of a little iodine, the velocity of bromination was found to be independent of the concentration of the bromine, *i.e.* equal quantities of bromine were used in equal times throughout the action. The action of various wave-lengths of light was determined with the help of a mercury lamp and light-filters, but all wave-lengths absorbed by the bromine appeared to take part equally in the photo-chemical action.

AN account of a Garratt locomotive made by Messrs. Beyer, Peacock and Co., Ltd., of Manchester, for the Darjeeling-Himalayan Railway, appears in *The Engineer* for March 10. This railway is of 2 feet gauge, and presents peculiar difficulties on account of the steep ascent and frequent loops or spirals and reverses, one of the latter having gradients of 1 in 28. Curves of 70 feet radius are numerous. The specification for the locomotive included the condition that it should be able to travel over reverse curves of 60 feet radius with a length of tangent between the curves of 20 feet only. The engine consists of a girder frame, which is pivoted and supported at its extreme ends on four-wheeled bogies. Each bogie is a miniature locomotive *sans* boiler. The boiler supplying both is carried between the bogies on the girder frame. As there are no wheels under the boiler, the size of boiler is practically unrestricted. There are four cylinders each 11-inch diameter by 14-inch stroke, and fitted with Walschaert's valve gear.

PROF. EMIL FISCHER'S lecture on "Neuere Erfolge und Probleme der Chemie," of which a translation appeared in *NATURE* of February 23, has been published by the firm of Julius Springer, Berlin, price 0.80 mark.

### OUR ASTRONOMICAL COLUMN.

THE SPECTRUM AND ORBIT OF  $\alpha$  PERSEI.—In No. 10, vol. ii., of the Publications of the Allegheny Observatory, Mr. Frank C. Jordan discusses the spectrum and orbit of the spectroscopic binary  $\alpha$  Persei. From a discussion of seventy plates, taken with the Mellon spectrograph during 1908-9, he finds that, instead of a radial velocity of  $-3$  km., as found by Vogel, the centre of the system has a radial velocity of  $+18.5$  km.; the orbit is practically circular, and the period is 4.4192 days.

The most striking fact deduced by Mr. Jordan, however, is that the H and K lines of calcium do not appear to participate in the displacements due to motion in the line of sight shown by the other lines. In other words, whilst helium, hydrogen, magnesium, and carbon lines in the star's spectra indicate that the star is revolving in a circular orbit, the H and K lines indicate that the calcium vapour producing them is moving with a constant velocity away from us. Prof. Hartmann found the same phenomenon in the spectrum of  $\delta$  Orionis, and, as the apparent velocity derived from the K line differed by 7 km. from the velocity of the centre of the system, he suggested that the calcium absorption took place in a medium lying between us and the star; such a suggestion is strengthened

by the fact that most stars exhibiting this peculiarity lie in nebulous regions. But Mr. Jordan is inclined to question the difference of 7 km., which might be obviated by adopting other standard values for the wave-length of K, and, very tentatively, suggests that a clue to the phenomenon may be found in the fact that, of eleven stars exhibiting the peculiarity, ten are strong helium stars.

THE DETERMINATION OF LATITUDE.—While the Talcott-Horrebaw method of determining latitude is the most important from the point of view of accuracy and facility of application, it generally necessitates the use of a specially constructed instrument, the zenith telescope. But in No. 4481 of the *Astronomische Nachrichten* Mr. Kiyofusa Sotome, of the Tokio Observatory, explains how the method may be used in connection with an ordinary field theodolite. Three wires, one vertical and two others  $45^\circ$  from the vertical, cross at the centre of the field of the telescope, and are carried by a reticle in the focal plane. Then a pair of stars are observed, circle east and circle west, and the time-intervals between the transits are noted. Knowing the declinations of the stars, Talcott's method gives the latitude, after the application of various corrections. Mr. Sotome explains the method in detail with formulæ, and shows that reasonable errors in the time intervals will not seriously vitiate the results. A series of seven observations at Tokio gave a mean error of  $\pm 0.80''$ , with a probable error of a single observation of  $\pm 1.63''$ .

THE RELATION BETWEEN THE SEPARATION AND THE MAGNITUDE OF VISUAL DOUBLE STARS.—In No. 176 of the Lick Observatory Bulletins, Dr. R. G. Aitken analyses the degree of separation and the magnitudes of the double stars, brighter than magnitude 9.5 and closer than  $5.0''$ , given in several large catalogues, and finds that the numbers of doubles consistently increase as one passes from the wider to the closer pairs. He also finds that the number of doubles of every distance-class under  $5.0''$  increases with increasing numerical magnitude; for instance, for B.D. stars as bright as magnitude 8.0 the proportion of doubles separated by less than  $5.0''$  is about 1 in 13½, but for B.D. stars between magnitudes 8.0 and 9.0 the proportion is only 1 in 25.

HALLEY'S COMET.—Already the periods of observation, both before and after perihelion, of Halley's comet, have easily exceeded those of any previous return; but observations are still being made at many observatories, and are likely to be continued for some time. M. Gonnessiat reports, in *Astronomische Nachrichten*, Nos. 4480-1, that on December 7 the magnitude was about 13.5, and that on February 25 it was 14.0.

In No. 4478 of the same journal Herr M. Ernst places on record his observations of the comet's magnitude on a number of dates extending from September 12, 1909, to June 30, 1910; his magnitudes for May 16 and 22, 1910, are  $-0.1$  and  $-0.2$  respectively.

THE PATH OF COMET 1886 I.—More than one hundred columns of the *Astronomische Nachrichten*, Nos. 4477-8, are taken up by an exhaustive discussion, by Dr. Erich Redlich, of the available observations of the large comet 1886 I. After giving and discussing each observation in detail, Dr. Redlich derives a set of elements which give the eccentricity of the orbit as  $1.0004461 \pm 0.0000141$ .

NOVA LACERTÆ.—The faintness of this nova and the almost persistent cloudiness of our skies have prevented any extensive recent observations. In No. 4476 of the *Astronomische Nachrichten*, however, Prof. Millosevich reports that on February 10 the magnitude was 8.8.

EARTHSHINE ON THE MOON.—To the casual observer of the heavens, the earthshine on the moon is deeply mysterious. On the evening of March 4, when our satellite was in conjunction with Saturn, the earthshine, as seen from Leeds, was unusually distinct, and many people, says Mr. J. H. Elgie in *The Yorkshire Post*, were led to believe that an eclipse was in progress. Mr. Elgie's observations showed that in the twilight the glow was of ashen hue, but that it deepened into olive as darkness came on.